# Silver Fire

## Burned Area Emergency Response (BAER) Team
## Executive Summary

**Black Range, Silver City, and Wilderness Ranger Districts**
**Gila National Forest**
**Silver City, New Mexico**
**July 11th, 2013**

# Executive Summary

## Introduction

The Silver Fire started on June 7th as a result of a lightning strike in the vicinity of Sawyers Peak located south of State Highway 152 on the Silver City Ranger District of the Gila National Forest. The majority of the fire is on National Forest System lands managed by the Silver City, Wilderness and Black Range Ranger Districts located east of the community of Mimbres, NM and west of the communities of Kingston and Hillsboro, NM. Approximately 788 acres of the burn is on privately owned lands and 9 acres of the burn is located on state lands.

A BAER team was assembled on June 17th which convened specialists in various fields, including hydrologists, soil scientists, wildlife biologists, geologists, ecologists, suppression team liaison, engineers, cultural resources specialists, and geographic information specialists. The team conducted field surveys to assess post fire emergency conditions. Modeling, data analysis and reports were prepared by specialists. The purpose of the emergency assessment was to identify values at risk on the Gila National Forest and surrounding areas from the Silver fire, and to submit a funding request to secure money for implementing treatments that could potentially lessen threats to life, property, and resources from indirect fire effects such as flooding, erosion and debris flows.

The Silver Fire continued to actively burn during the BAER assessment. The assessment was conducted in two phases. Phase 1 of this assessment with its associated Values at Risk used the 6/21/2013 soil burn severity which was based on BARC imagery dated 6/13/2013 and 6/21/2013. Phase 2 of this assessment with its associated Values at Risk used the 7/9/2013 soil burn severity which was based on SPOT imagery taken on 7/4/2013, BARC imagery taken on 7/7/2013 and aerial and ground hand mapping conducted from 7/2/13 to 7/7/2013. Both phase 1 and phase 2 imagery were adjusted by team soil scientists after field assessments to reflect observed field conditions and degree of soil hydrophobicity (water repellency) throughout the burned area. At this point the fire is 138,698 acres and 80% contained. Currently fire activity is minimal due to recent precipitation over the burn area.

The burn area is comprised of very steep and rugged terrain ranging from pinyon-juniper scrub at 6,000ft to mixed conifer at 10,000ft elevation. Numerous very steep slopes and high gradient drainages located within the burned area will transport significant water and debris flows during subsequent rain events. Many of the channels have not experienced high flows in many years and consequently have large amounts of stored sediments that could easily be transported under peak flows.

The vegetation and duff layer that once served to intercept, absorb and hold water were eliminated in the moderate and high severity burn areas within the fire area. Extremely steep long slopes will further add to the loss of control of water, excessive downstream sedimentation and loss of site productivity.

The Silver Fire has severely burned large contiguous tracts of forest system lands across the crest of the Black Range, including the headwaters of South, Middle and North Percha Creeks, Mineral Creek, and Carbonate Creek that drain directly into the communities of

Kingston and Hillsboro. The headwaters of Gallinas Canyon also experienced a significant amount of high severity burn. The headwaters of the Mimbres River including Allie Canyon-Mimbres River and Powderhorn Canyon-Mimbres River sixth code watersheds that drain into the community of Mimbres have experienced high burn severity as well. All of these areas drain onto public lands where homes and infrastructure could be affected by high post fire flows. The majority of these communities are situated in the floodplain and have experienced high flows and flooding in the past without any burn in the upper watershed.

Orchards, farm fields and irrigation ditches located along the Mimbres River and associated floodplain are expected to be impacted by increased peak flows and ash. New Mexico State Highway 152, a popular route that attracts many visitors each year, is expected to be severely impacted by post fire conditions.

Las Animas Creek is expected to experience an increase in post fire peak flows. The distance to the nearest private properties and associated agricultural lands are approximately 12 miles downstream which will allow attenuation of peak flows.

The communities of Kingston and Hillsboro are expected to see increased post fire peak flows and associated ash. These flows and associated ash are expected to impact private properties located near or within the floodplain.

Severe damage to Forest Service infrastructure including numerous forest system roads totaling 34 miles, six developed Forest Service campgrounds and approximately 100 miles of trails will also be severely impacted by post fire erosion, sedimentation and flooding.

Additionally, pre-fire erosion rates commonly less than one ton per acre have been modeled post-fire to over 36 tons per acre. This greatly exceeds the dominant pre-fire soil loss tolerance of 1 to 3 tons per acre. Changes in runoff response compounded by sediment bulking are issues of serious concern for downstream values of public safety human life and property.

Loss or damage to critical natural resources, including soil productivity, water quality, watershed health, cultural resources, threatened and endangered species and critical wildlife habitat has resulted from this fire and irreversible damage is expected if management action is not taken in the watersheds mentioned above. A significant amount of high and moderate burn severity has occurred in the headwaters of the Mimbres River and Animas Creek, 303d listed streams, located in the Aldo Leopold Wilderness affecting numerous Outstanding National Resource Waters (ONRW) totaling 35 miles.

## Burn Severity of the Silver Fire

Burn severity measures the effect the fire had on the vegetation and the soil. High severity burns can result in water repellent soils, sterilization and consumption of the seedbank, removal of all vegetative ground cover, complete overstory removal and loss of hydrologic function resulting in increased water flow in draws and canyons.

The following table indicates the acres of land within each burn severity class within the fire perimeter for Phase 1.

| Burn Severity Class | Acres | Percentage of Fire Area |
|---|---|---|
| High | 20,793 | 15 |
| Moderate | 36,931 | 27 |
| Low & Unburned | 80,292 | 58 |
| *Unknown | 683 | <1 |
| Total Acres | 138,698 | 100 |

*Unknown acres represent areas within the burn perimeter at the time the BARC imagery was taken but no data was collected by the satellite sensors.

**Photo: Mosaic Burn Severity**

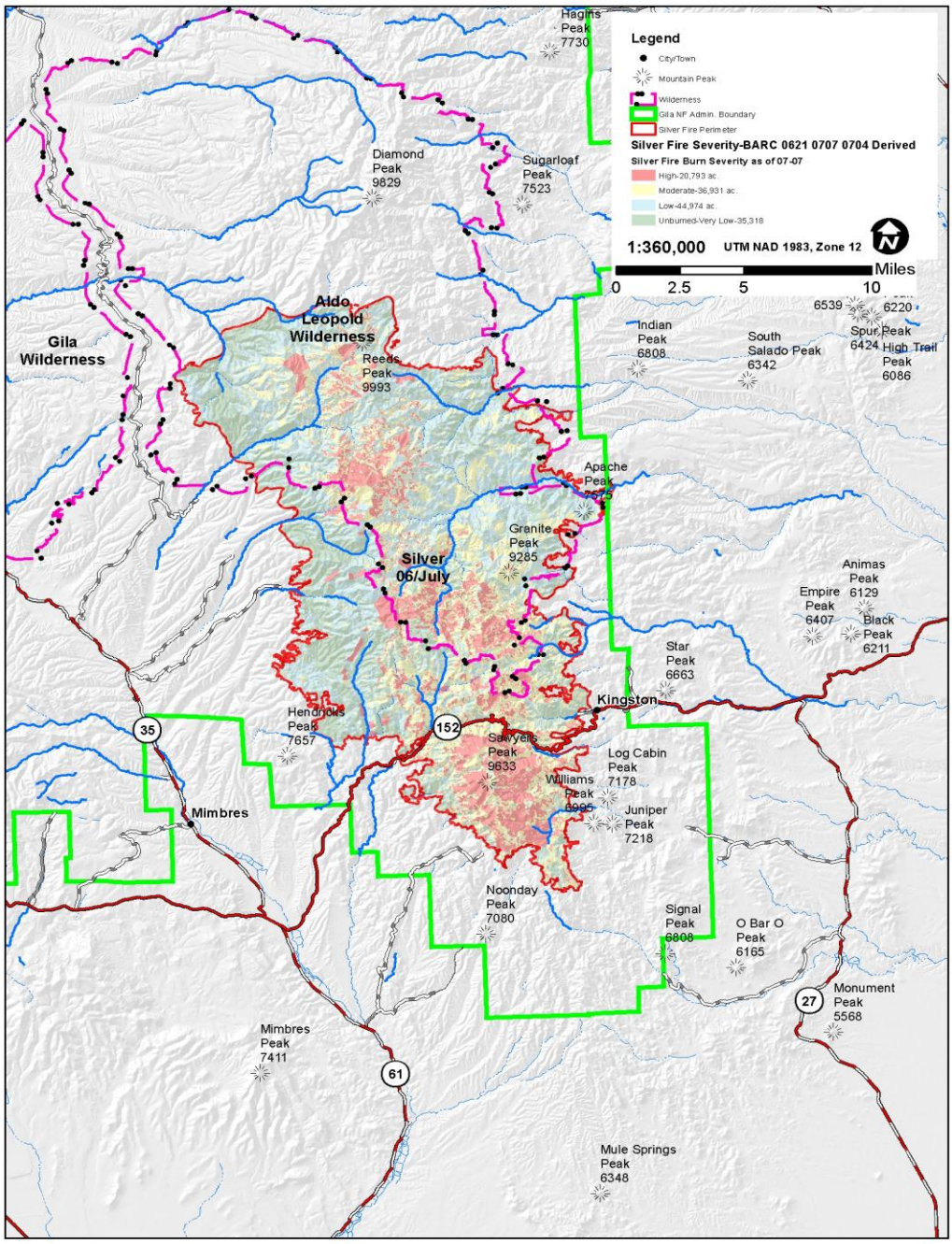


**Figure 1. Location map of the Silver Fire.**

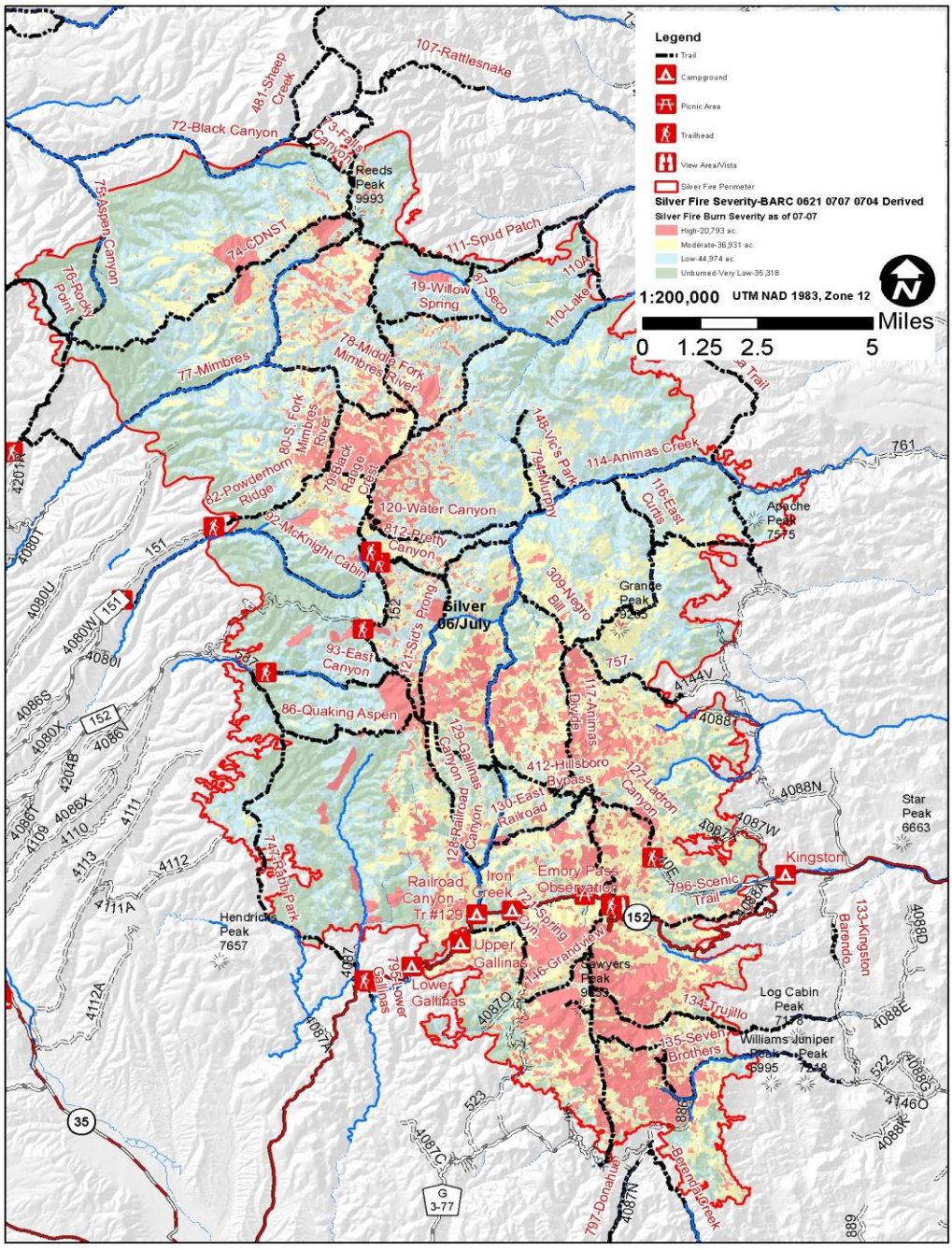


**Figure 2. Silver Fire Soil Burn Severity Map**

## Values at Risk

The Silver Fire, burned mainly on National Forest lands approximately 683 acres of private lands were affected. The fire burned in Pinyon/Juniper woodland, Ponderosa Pine forest, and Mixed Conifer forest. The vast majority of high severity burn was a result of extreme fire behavior which resulted in stand replacing burns in mixed conifer. Post fire conditions resulted in degraded watersheds that have the potential to negatively impact downstream values including life, property, public safety, natural and cultural resources.

The risk matrix below, Exhibit 2 of Interim Directive No.: **2520-2010-1**, was used to evaluate the Risk Level for each value identified during Assessment:

| **Probability of Damage or Loss** | **Magnitude of Consequences** | | |
|---|---|---|---|
| | Major | Moderate | Minor |
| | Loss of life or injury to humans; substantial property damage; irreversible damage to critical natural or cultural resources. | – Injury or illness to humans; moderate property damage; damage to critical natural or cultural resources resulting in considerable or long term effects | Property damage is limited in economic value and/or to few investments; damage to natural or cultural resources resulting in minimal, recoverable or localized effects |
| | **RISK** | | |
| Very Likely (>90%) | **Very High** | **Very High** | **Low** |
| Likely (>50% to <90%) | **Very High** | **High** | **Low** |
| Possible (>10% to <50%) | **High** | **Intermediate** | **Low** |
| Unlikely (<10%) | **Intermediate** | **Low** | **Very Low** |

The following risks are based on the BAER risk assessment matrix. The Very High and High Risk are unacceptable risk levels due to threats to human life, property, infrastructure and resources, therefore treatments should be applied. For an Intermediate Risk, this could be unacceptable if human life or safety is the critical value and treatments may be needed. The highly unstable conditions put the following Values at risk and were assessed using the risk matrix:

## Human Health and Safety

There is a high risk of loss of life on Forest Service and private land within and downstream of the burned area. Individuals who may find themselves in any of the campgrounds, trails, drainages, or on roads affected by the fire are at risk during and after storm events. Campgrounds, trails and drainages off Highway 152 and the highway itself are examples of these life threatening risks. The watersheds and associated drainages affected by high burn severity will be subject to higher than usual run-off and debris flows which could cause injury or death. Private properties along the Mimbres River have private access drives that cross the river and are mainly located within the floodplain. These crossings are likely to experience limited access at times of high flows. In the communities located downstream of the burned area, post fire flows are expected to increase and the likelihood of damage to homes and infrastructure as well as potential of injury or death to people could occur.

## Property

There is a high risk of public and private property damage due to storm runoff and debris flows. Peak flows of up to 2 times pre-fire can be expected in drainages associated with high burn severity across the burned area. The increase in peak flows resulting from areas of high burn severity, and the loss of channel structure pose a significant threat of flood waters and debris flows that will impact Forest Service infrastructure and private property (e.g. FS campground, roads, trails, homes, fields, irrigation ditches, ground water wells, culverts, bridges and low water crossings). Forest service roads within the burned area are very important access points to the forest as well as private homes and inholdings within forest boundaries. The communities of Kingston, Hillsboro and Mimbres are expected to be impacted by higher peak flows, sedimentation and ash. Several bridges along New Mexico Highway 152 between Kingston and Hillsboro NM have a very high potential to be damaged. New Mexico 152 within the burned area is expected to be heavily impacted by high flows and excessive sedimentation. Potential loss of portions of this road are anticipated.

## Natural Resources

### Soils

There is a high risk of increased levels of surface soil erosion and sediment delivery predicted to result as an effect of the burn severity within the Silver Fire burned area. Modeling shows that erosion will increase from pre-fire levels just over 0 tons per acre to post fire levels of over 38 tons per acre. The initiation of new surface erosion sources from

moderately steep and steep slopes pose an extreme threat to long-term soil productivity, increased risk of water quality impacts, and threats to downstream resources, property and life from bulking of flood flows.

## Hydrologic Function

Hydrologic function will be greatly reduced due to loss of vegetative overstory, vegetative ground cover, and the duff layer. The loss of these layers in the ecosystem has profound negative effects to hydrologic function. In a functioning watershed these layers intercept and slow raindrop impact, absorb and slow overland flow, and provide a natural resistance to excessive erosion. Recovery of watershed condition and hydrologic function can take up to 25 years to stabilize.

## Water Quality

Surface water quality will be greatly degraded initially due to post fire ash and sediment deposition in all HUC 6 drainages affected by the burn. Typically these effects to surface water quality last from 3-5 years. Ground water wells may be adversely affected and potentially contaminated during high flow events and associated sealing of ash.

## Outstanding National Resource Waters

ONRW's are water bodies designated to receive special protection by the Water Quality Control Commission under New Mexico State water quality standards and the federal Clean Water Act. Degradation must be minimized in terms of degree and duration. One half-acre of designated ONRW meadows, 55 acres of designated ORNW wetlands and 35 miles of ONRW streams have been burned in the fire area analyzed by the BAER team and will be impacted by ash, sediment, and debris flows in subsequent rain events.

## Riparian Vegetation

Riparian areas are at high risk on NFS lands due to changes in peak flows, which will result in channel erosion and damage or loss to the riparian vegetation. Riparian vegetation within the stream drainages are expected to be subject to increased channel erosion and scour as well as deposition of ash, sediment and debris from upstream areas of high burn severity. This will result in warming of surface waters due to the loss of streamside shade, which will negatively impact or cause a compete loss of aquatic habitat for fish and macro-invertebrates.

## Threatened and Endangered Species

The Mexican Spotted Owl is considered a permanent resident of the Gila NF. A total of 18 Mexican spotted owl PACs occur within the Silver Fire burn perimeter analyzed for the BAER assessment.

The Chiricahua Leopard Frog currently occupies one stream within the Silver fire perimeter. The only recovery unit within the Silver fire perimeter is Seco Creek.

The Gila trout currently occupies two streams within the Silver fire perimeter, McKnight Creek and Black Canyon. The population in McKnight Creek inhabits approximately 5.3 miles of stream. McKnight Creek is a tributary to the Mimbres River and is not within the historical range of Gila trout. The Black Canyon watershed received minimal burn severity.

## Cultural Resources

The Gila National Forest contains high densities of cultural resources, however, much of the Silver Fire burn area is in higher elevations (7500 feet and above) which are considered low density. Sites in higher elevation tend to be historic properties. Increased flows of runoff and sediments as well as hazard trees pose a threat to archaeological sites and historic properties.

There are approximately 45 archaeological sites located within the burn perimeter. Only 30 of these sites received field assessments. Of the 45 archaeological sites located in the burn perimeter, 5 archaeological sites or historic properties are eligible for the National Register of Historic Places, 39 sites are unevaluated, and two sites, the Hillsboro and Reeds Peak Lookout Sites, are “Listed” on the National Register of Historic Places. The types of sites associated with the high risk category for the Silver Fire BAER assessment are historic sites that include one Civilian Conservation Corp (CCC) sites and an historic mining occupation. Treatments are warranted for these sites.

## Emergency Recommendations and Treatments

## Objectives:

- Protect National Forest investment in its road infrastructure and developed campgrounds and minimize negative impacts to the road and highway infrastructure of other jurisdictions.
- Reduce negative impacts to soil productivity and hydrologic function.
- Reduce the threat to loss of life and property, downstream flooding, erosion and debris.
- Reduce the threat of hazard trees to safety of, roads, and trail treatment crews.
- Reduce negative impacts to water quality, critical aquatic habitats and populations.

## Recommendations/Treatments

The following is a summary of treatments recommended for the immediate emergency. Treatments were prescribed based on the potential for damaging floods, loss of soil productivity; to minimize soil erosion and loss of control of water as well as for the mitigation of and protection against loss of life, property and critical infrastructures.

1. Place closure gates and post warning signs at key access points of the burn area to protect the public from entering the burned area and prevent exposure to the hazards of the burned area. Signs will be posted at roads, trailheads, and campgrounds.
2. Place closure gates at entrances of developed campgrounds to prevent exposing

people to potential flooding that may occur in these campgrounds.

3. Seed approximately 12,950 acres of large contiguous areas of high severity burn to provide for relatively quick establishment of vegetative ground cover to assist the burned area in maintaining soil productivity. This treatment will assist in reducing the amount of erosion and loss of control of water that the burned area will experience. Seeding of the high and moderate burn severity is also proposed for the Historic Hillsboro Mining District. This is intended to assist in stabilizing slopes and reducing negative effects to water quality.
4. Mulch approximately 2,900 acres of high severity burn in the historic Hillsboro Mining District in order to minimize the negative effects to water quality from runoff and sedimentation from this area. Mulching will also assist in seed germination and overall seeding success, while potentially minimizing negative downstream effects from mines and associated tailing piles located on Forest System lands.
5. Ensure access to the fire lookout on Hillsboro Peak. This lookout is critical in detecting and reporting new starts on the southern end of the Forest. It has been recommended that an ALERT early warning system be installed and maintained at the lookout site. This site will need to be visited by the The Elephant Butte Irrigation District (EBID) for installation and maintenance. Trail maintenance will be done on 8 miles along the Crest Trail #79 to support the warning system installation and maintenance and to allow access for fire lookout personnel.
6. Mitigate damage and reduce excessive erosion to Forest system trails and the Continental Divide National Scenic Trail by installing additional drainage to areas of trails that are susceptible to erosion due to post fire conditions.
7. Stabilize Heritage sites that consist of archaeological sites, historic buildings, and traditional cultural properties (TCPs) from post fire conditions relating to storm runoff and hazard tree impacts.
8. Remove floatable debris from channels along Highway 152 where Forest Service campgrounds are located and FR 40E that runs parallel to Middle Percha creek directly above the town of Kingston. This is intended to prevent culverts from becoming blocked and causing additional damage to campground facilities, life and property.

## Protection and Safety – Early ALERT precipitation monitoring systems

Due to the potential threats to human life and safety from post-fire conditions that exist within the Silver Fire, the BAER Team recommends that Federal, State, County, and local collaborators seriously consider the installment of ALERT precipitation monitoring systems. EBID has inquired about sites on forest land within the burn area that ALERT precipitation monitoring systems could be installed. Per this request of information sites in key watersheds have been identified on National Forest Lands that would be appropriate for the installation of these systems. One site would be on the Hillsboro Lookout another site would be located at the junction of the Sawyers Peak Trail (#79A) and the Crest Trail (#79), and a third site would be located a mile south of the second site along the Crest trail (#79). The

ALERT system can measure rainfall and duration to allow early detection of hazardous conditions. The National Weather Service is responsible for setting thresholds relative to precipitation, and issuing flashflood warnings. The ALERT communication system can provide local emergency networks with direct contact via phone, cell phone, and satellite to allow for real-time tracking of conditions via internet connections. The EBID would be responsible for placing, maintaining, and operating the equipment. The BAER team bases this recommendation on the high burn severities as a result of the fire, the potential post-fire conditions, and the urban interface values at risk below the burn area.

## Monitoring

Silver Fire BAER treatments will be monitored to determine if 1) treatments were implemented to expected standards; 2) treatments were successful (effective ground cover, road damage mitigation, resources mitigation); 3) treatments resulted in undesirable results (noxious weeds).

Monitoring treatment implementation will include verification of proper seeding and mulching rates as it is being applied to the ground. This will allow any adjustments, if necessary to ensure proper and appropriate coverage of the treatment to the affected area. Initial photo points will be established in this monitoring endeavor. In addition, monitoring by aquatic biologists will be done along affected streams to determine if treatments were effective in preventing loss of critical fish populations as well as monitoring general habitat to determine if treatments precluded damage that would render habitat unsuitable.

Monitoring treatment success will entail follow-up monitoring for the seeding and mulching to ensure effectiveness. This will be done post monsoon season and again after snow melt in the spring, as will the post treatment monitoring of the recreation sites, the roads, and the non-native invasive species locations. In addition, storm patrols have been outlined, to have immediate monitoring and response after significant rain events, reviewing affected roads to ensure those treatments are functioning as planned and identify any debris flows requiring removal to protect FS roads.

## Conclusion

As of July 11, 2013, the Silver Fire burned approximately 138,698 acres across three Ranger Districts and is currently 80% contained. High and moderate burn severity covers 57,724 acres or approximately 42 percent of the burn area.

Key canyons and creeks in this burn area drain directly into communities and residential areas. The number of residences, infrastructure and commercial properties below the burn run a very high risk of experiencing effects during high intensity or long duration precipitation events from the burn area.

The use of aerial seeding and mulching has been found to be very successful in effectiveness of establishing cover on high to moderate severe burn areas. The other treatments, including roads, trails, cultural heritage sites and channel treatments, can be implemented immediately upon receiving funding.

It is important to note that these are mitigation measures only. Efforts can and will be expended in putting these treatments into place, but both sedimentation and increased flows as a result of the fire, are highly likely. Monitoring of the effectiveness of the treatments will be critical, and the Forest will need to be aware of the continued need for specialists and Forest personnel both during implementation and post monsoons. In addition, personnel will be needed to patrol portions of the burn area after high intensity rainfalls during the monsoon season.